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Title of Invention	Process and method for the refom/reinforcement of concrete building structure using a rod



## Abstract

The invention relates to the repair / reinforcement method of the concrete structure using the load. And particularly, it is about the repair / reinforcement method of the concrete structure using the load progressed as the chipping process, the sphere strengthening process, and the section restoration process, the load attaching process and finish process.

It characterizes to the concrete means for achieving the object of the present invention to be comprised of the chipping process, removing the concrete which is degraded in the concrete structure and is rusted and the sphere strengthening process, of strengthening sphere the chipping process by using the permeate type hardener for the concrete which is insolvent in one concrete structure and the section restoration process, of being the cross section restored the sphere strengthening process by using the garnet entrainment aqueous acrylic Polymer mortar for one concrete structure and the load attaching process, of adhering the load to the section restoration process to one concrete structure and the finish process of closing the load attaching process by using the garnet entrainment aqueous acrylic Polymer mortar for one concrete structure.



## Representative Drawing(s)

Fig. 1



## Description

#### ※ Brief Explanation of the Drawing(s)

The general flowchart of the repair / reinforcement method of the concrete structure according to the embodiment in Figure 1 the invention.

The flowchart showing the load fit strategy according to the embodiment in Figure 2 the invention.

The perspective view of the load holder according to the embodiment in the drawing 3a the invention.

The cross-sectional view of the concrete tunnel structure reinforced to the drawing 3b the invention with the repair / according to the embodiment.

The perspective view of the other load holder according to the embodiment in the drawing 4a the invention.

The cross-sectional view of the concrete structure reinforced to the drawing 4b the invention with the repair / according to the embodiment.

The cross-sectional view of the concrete structure reinforced to Figure 5 the invention with the other repair / according to the embodiment.

The cross-sectional view of the load according to the embodiment in Figure 6 the invention.

The description \* of the symbol about the main part of \* drawing.

20: load 22a: carbon fiber rod.

22b: glass-fiber rod 22c: aramid fiber rod.

26: epoxy resin / vinylester resin 28a: silica.

28b: garnet 30: load holder.

32: clip 34: recess.

110: the rusted concrete 120: permeate type hardener layer.

130: garnet entrainment aqueous acrylic polymer mortar layer 140: rod member layer.

150: garnet entrainment aqueous acrylic polymer mortar layer.

#### ※ Details of the Invention

##### ※ Purpose of the Invention

##### ※ The Technical Field to which the Invention belongs and the Prior Art in that Field

The invention relates to the repair / reinforcement method of the concrete structure using the load. And particularly, it is about the repair / reinforcement method of the concrete structure using the load progressed as the chipping process, the sphere strengthening process, and the section restoration process, the load attaching process and finish process.

Generally, there can be the problem of the safety accident including damage and crippling of the ferroconcrete, the damage of \*\*\* structure due to the corrosion of \*\*\* structure etc. the compressive strength of the concrete and the tensile strength of the steel reinforcement fall down as the degradation in which the concrete is the exfoliation / exforiation / aberrant in the construction structure of the various including the engineering works (tunnel) structure and crack of the ferroconcrete etc.

The concrete has the strong alkali nature (PH=12.5) to, and the factor of the concrete degradation factor / degradation and the reinforcing rod corrosion is not progressed.

But the neutralization phenomenon is progressed in the ferroconcrete and the steel reinforcement rusts in the reinfoeced concrete structure described in the above due to the contraction / expansion under the penetration of the carbon dioxide / acid material / salt material (chlorine ion) and alkali aggregate reaction and weather condition and the rust sweeps.

And the ferroconcrete is damaged by the exposure phenomenon etc. and is the local of the steel reinforcement the cracking is generated due to the expansion of the rust in concrete form if the rust sweeps at the steel reinforcement and in which the exfoliation / exforiation phenomenon of the reinfoeced concrete structure is generated and which is rusted the concrete structure reaches to the radioactive decay.

Moreover, while the facility structures of cement concrete including all kinds of the engineering workses and construction are neutralized with the penetration of the carbon dioxide, the neutralization phenomenon of the cement concrete is accelerated, gravel and the sand mixed in not only the penetration of the carbon dioxide but also the cement concrete as to the phenomenon, that the facility structure becomes weak to the corrosion of the steel reinforcement and concrete crack phenomenon are known in case of the effusive rock.

Generally when doing the repair / reinforcing construction of the underwater concrete structure about the lesion damaged to the engineering work structure, including, the concrete structure, deterioration and corrosion of the cement structure including the mortar as described above, the concrete etc. as to the repair / enforcement box, repair and reinforcement construction were constructed to the mortar, and the concrete to the epoxy resin. But even if it carried out the construction with repair and reinforcement of the concrete structure, degraded the strength degradation and the problem the repair / reinforcement was relaxed if it was unable to be integrated and the specified period passed and that repair and reinforcement function were deprived had a lot of the existing deterioration lesion and repair / reinforcing member.

And there is a problem that in the repair / reinforcing composition of the degraded concrete of prior, as a concrete example, the FRP repair / reinforcing composition, the coefficient of elasticity is usually small to about plastic and the glass fiber has to be avoided the place where rigidity is required with the laminated molding of the thermosetting resin for the low-pressure molding which it is done by the principal reinforcing material. And it is suitable for the protection of the concrete for preventing the detachment preventive structure progression of deterioration of the concrete etc. but the adhesive force of the concrete and property \*\*\* damp surface are decreased.

In the composition of the dissimilar asystole grout cross section enforcement, it is so far widely most used as repairing method about the wall in which the steel reinforcement is exposed by the exfoliation / drop-out of the concrete according to the progressing of the coating shortage phenomenon of the concrete or deterioration etc. And the coupling material uses the cementitious material and stalk and aftershrinkage does not occur. But the performance in which it is impossible to the underwater work and which is required to the reinforcing material is unable to be satisfied. And the performance has. The peel strength which is especially, the most important element as the compressive strength / flexural strength and reinforcing material is unable to be maintained.

In the of late, products improving the problem at repair and reinforcement construction of prior are known as the admixture, which adds the engineering work structure, including, repair and reinforcement and iron bridge of the concrete structure, including, the ironware structure, the metal roof, including, the metal structure including the

mortar as described above, the concrete etc. in order to give the crack maintenance and waterproof agent, the coating material for calking, and strengthening and watertight to the waterproofing coating agent, transparent light tag finishing agent, the room lubricant for anti-skid, sealant which reinforces with the repair / the room lubricant and waterproof agent, coating and adherend, the elasticity anti-rust poisonous by salt protecting coating agent, the rust processing agent etc.

And it is coating agent having the enveloped which compositions reinforcing the facility structure, and the ironware structure with the repair / coat with paint in the surface of structure of mortar concrete including this conventional all kinds of engineering works and construction, or the penetration of the carbon dioxide of airborne is delayed to the additive added in the mortar and the finishing agent finalizing structure in the facility structure of the cement concrete to the film formed in the surface and it makes the neutralization speed of the cement which is the high alkaline slow. Therefore, while preventing the intensity maintenance of the cement concrete structure and corrosion of the steel reinforcement and supplementing the lifetime of the cement concrete structure, with preventing the gives complementary damage it is anti-corrosive known in moreover, the ironware structure and metal structure with the film formed in the surface.

And the neutralization delayed effect was known that the effect that was excellent in case gravel and sand of the effusive rock were put in use and the degradation of the concrete was accelerated. But the burden in which the cost was the high price and their composition selected the proper product according to the degraded state of the repair / enforcement object structure and in which the air got longer economic burden had on the construction which sequentially had to carry out the construction of these products to be complicated and the construction cost was enhanced and was great.

And the steel reinforcement is used for the architectural concrete structure, tunnel concrete structure, bridge concrete structure, creek covered by lid concrete structure, harbors concrete structure, the dam concrete structure etc building new for the enforcement. And it is difficult that the weight is heavy and this steel reinforcement handles and the rust sweeps in the long-term preservation and the strength falls down. And as to the steel reinforcement, which is laid within especially, the invasion paper or the underwater concrete structure the rust sweeps and the cracking shape is quickly progressed in the concrete structure and many improvement of the etc. in which the lifetime of the concrete structure shortens is required.

#### ❖ The Technical Challenges of the Invention

There can be the purpose providing convenience, the robustness, and the application property as to the repair / reinforcement method of the concrete structure closed, and of being principal to provide the repair / reinforcement method of the concrete structure using the load which enduringly can decide on the lifetime of the concrete structure as the invention is the high intensity mortar with a superior peel strength, the compressive strength, the flexural strength, watertight, the abrasion resistance, polishability, the room activity etc in the load which is worked out in order to solve, and the tensile strength is excellent the problem as described above.

Characterize to the concrete means for achieving the object of the present invention to be comprised of the chipping process, removing the concrete which is degraded in the concrete structure and is rusted and the sphere strengthening process, of strengthening sphere the chipping process by using the permeate type hardener for the concrete which is insolvent in one concrete structure and the section restoration process, of being the cross section restored the sphere strengthening process by using the garnet entrainment aqueous acrylic Polymer mortar for one concrete structure and the load attaching process, of adhering the load to the section restoration process to one concrete structure and the finish process of closing the load attaching process by using the garnet entrainment aqueous acrylic Polymer mortar for one concrete structure.

Moreover, according to the single-side of the present invention, the load attaching process characterizes to be comprised of the load holder attaching process adhering to the load holder to the concrete structure, and the load attaching process of adhering the load to the load holder.

Moreover, according to the invention, and, the other single-side, the load attaching process characterizes to be comprised of the sticking groove generating process producing the load sticking groove in the concrete structure, and the load attaching process of adhering the load to the generated sticking groove as described above.

Moreover, according to the invention, and, the other single-side, it comprises the carbon fiber rod, and the glass-fiber rod or aramid with baculate and the load characterizes the silica different to be thick or the to adhere the garnet thing with the epoxy resin / vinylester resin.

#### ⌘ Structure & Operation of the Invention

Hereinafter, referring to the figure specifically, it is the same as that of the next time.

Figure 1 is a general flowchart of the repair / reinforcement method of the concrete structure according to the embodiment in the invention.

Referring to the figure, the repair / reinforcement method of the concrete structure of the present invention is comprised of chipping process (S10), sphere strengthening process (S20), and the section restoration process (S30) transient load attaching process (S40) and finish process (S50).

The thing which is the essential requisite to completely remove the rusted part to the process of removing the concrete (110) in which the chipping process (S10) is degraded in the concrete structure and which is rusted, and together removes the concrete in the region circumference which whether was rusted or not noted but is rusted are the most desirable.

Moreover, by using the permeate type hardener for the concrete region which becomes weak to the chipping process (S10), the sphere strengthening process (S20) forms the permeate type hardener layer (120). The basis of the repair / enforcement of the concrete structure in which the life is longer is strengthened.

Here, the section restoration process (S30) uses material including the garnet entrainment aqueous acrylic Polymer mortar etc. for the chipping process (S10) and the concrete structure smoothed to the sphere strengthening process (S20) and it is restored the cross section. The garnet mixing water nature acryl polymer mortar layer (130) is formed. The load (20) bond is steadily accomplished of task.

At this time, as shown in the flowchart which said furnace two attaching process (S40) show the load fit stratege according to the embodiment in Figure 2the invention, two kinds of other process can be selectively implemented.

It is the method for adhering the load to the concrete structure by using the load holder (30) to the first method.

As shown in the cross-sectional view of the concrete tunnel structure which is reinforced to the perspective view of the load holder according to the embodiment and drawing 3b the invention to the drawing 3a the invention with the repair / according to the embodiment when setting up the holder used for the process described in the above in the site which becomes like tunnel with curve, the load holder (30) in which a pair of clip (32) and recess (34) are formed with equally-spaced is used.

The attaching process (S41) the load holder (30) is that the rod member layer (140) the fixing member is used is formed in the concrete structure of the bent site like tunnel the recess (34) formed with equally-spaced is used.

Here, it is comprised of the process (S43) adhered the load adhering the load to a pair of clip (32) formed in the load holder (30) adhered to the concrete structure.

Moreover, the thing used with rod member intersecting the reload (20) in the load (20) which as shown in the cross-sectional view of the concrete tunnel structure which is reinforced to the perspective view of the other load holder according to the embodiment and drawing 4b the invention to the drawing 4a the invention with the repair / according to the embodiment in case of using in the plane structure like the general concrete structure, is adhered to the load holder (30) and fixed to the steel reinforcement (other string) etc are the most desirable.

At this time, it can use the method like the time used in the plane structure in floor and wall in common.

As shown in the cross-sectional view of the concrete structure reinforced to Figure 5 the invention for the second method with the other repair / according to the embodiment, the sticking groove generating process (S42) producing the load sticking groove adhering the load to the section restoration process to one concrete structure is done.

It consists of the process of adhering the load (20) to the sticking groove generated in the sticking groove generating process and forming the rod member layer (140) with the configuration (S43).

It can use the second method in the concrete tunnel structure and general concrete structure in common.

Moreover, the does not carry out the chipping process and sphere strengthening process when using in the reinforcement method state is desirable to practice in the state that.

At this time, according to two methods is the difficulty of task, builder selectively can implement.

By using the garnet entrainment aqueous acrylic Polymer mortar for the load (20) and the adhered concrete structure, it closes and the finish process (S50) forms the garnet mixing water nature acryl polymer mortar layer (150). The concrete structure is clean, the sense of taste beauty is given as visibility.

It is the same as that of the next time if the load is illustrated in Figure 6 the invention with reference to the cross-sectional view of the load according to the embodiment.

The load (20) comprises the load in which burglar is high with the carbon fiber rod (22a) of the central part, and the glass-fiber rod (22b) or the aramid fiber rod (22c). And the other silica (28a) or the garnet (28b) is adhered to be thick and the property bond with resin or compo is high comprised.

At this time, the load (20) selectively uses the carbon fiber rod (22a) of the central part, and the glass-fiber rod (22b) or the aramid fiber rod (22c). It compares with the steel reinforcement of the same aperture and the weight less than the intensity of the factor of ten extent and 1/10 is maintained with the property and mutual complementary relation of the property comprised and the property without the degeneration of the property is maintained.

#### ■ Effects of the Invention

As described above, it has the effect that as to the repair / reinforcement method of the concrete structure closed by the high intensity mortar with a superior peel strength, the compressive strength, the flexural strength, watertight, the abrasion resistance, polishability, the room activity etc in the load in which the tensile strength is excellent, convenience, the robustness, and the application property can be provided. Moreover, the lifetime of the concrete structure can be enduringly preserved.



Claim 1 :

The repair / reinforcement method of the concrete structure using the load wherein it is comprised of the chipping process removing the concrete which is degraded in the concrete structure and is rusted and the sphere strengthening process: of strengthening sphere the chipping process by using the permeate type hardener for the concrete which is insolvent in one concrete structure and the section restoration process: of being the cross section restored the sphere strengthening process by using the garnet entrainment aqueous acrylic Polymer mortar for one concrete structure and the load attaching process: of adhering the load to the section restoration process to one concrete structure and the finish process of closing the load attaching process by using the garnet entrainment aqueous acrylic Polymer mortar for one concrete structure.

Claim 2 :

The repair / reinforcement method of the concrete structure using the load of claim 1, wherein it is comprised of the load holder attaching process adhering to the load holder to the concrete structure, and the load attaching process of adhering the load to the load holder.

Claim 3 :

The repair / reinforcement method of the concrete structure using the load of claim 1, wherein it is comprised of the sticking groove generating process producing the load sticking groove in the concrete structure, and the load attaching process of adhering the load to the generated sticking groove as described above.

Claim 4 :

The repair / reinforcement method of the concrete structure using the load of claims 1 through 3, wherein the load comprises the carbon fiber rod, and the glass-fiber rod or the aramid fiber with baculate and it adheres the silica or the garnet different to be thick with the epoxy resin / vinylester resin.



Drawings

Fig. 1

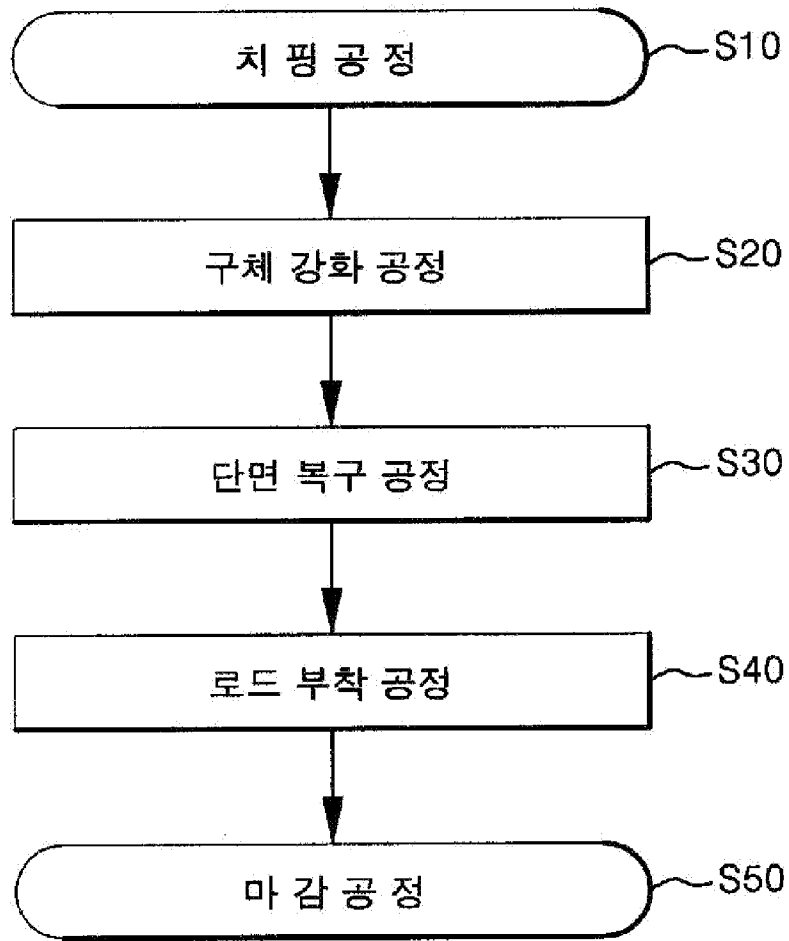


Fig. 2



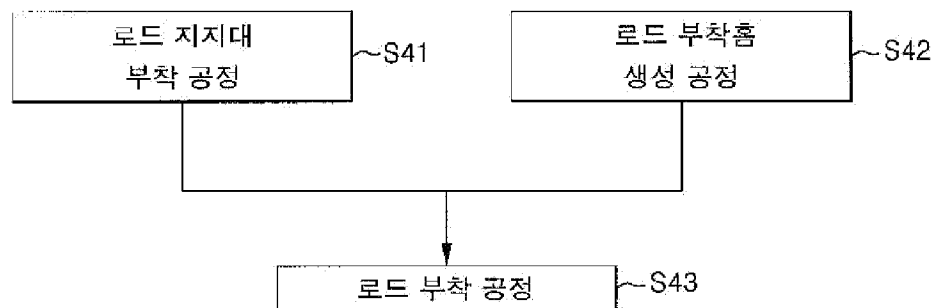


Fig. 3a

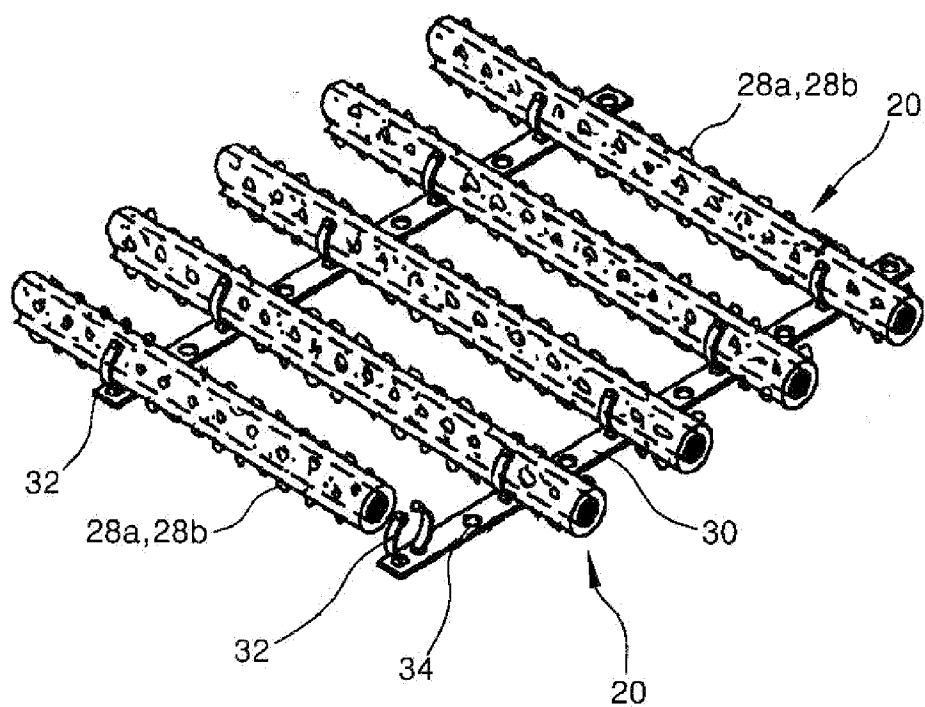


Fig. 3b

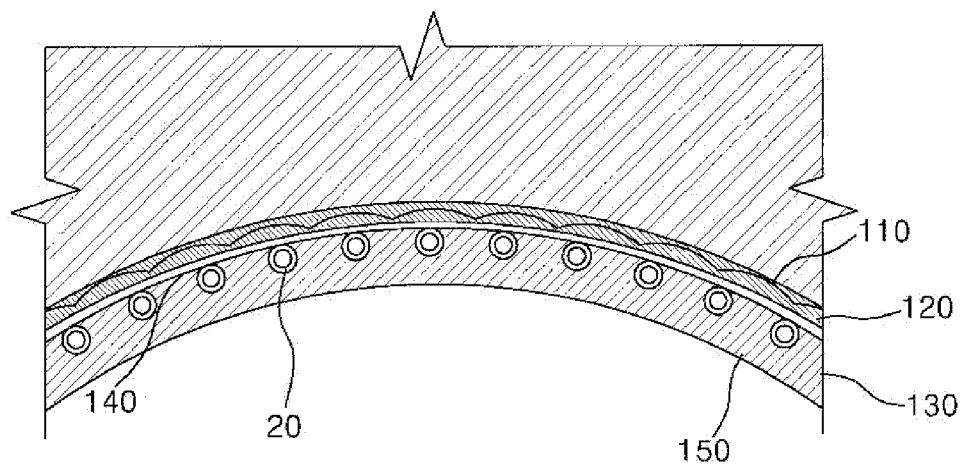


Fig. 4a

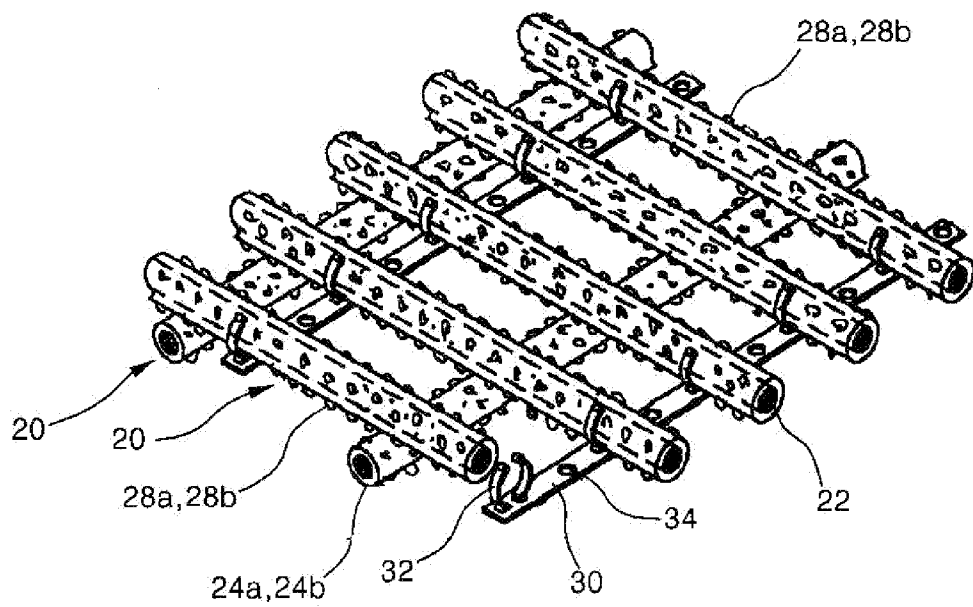


Fig. 4b

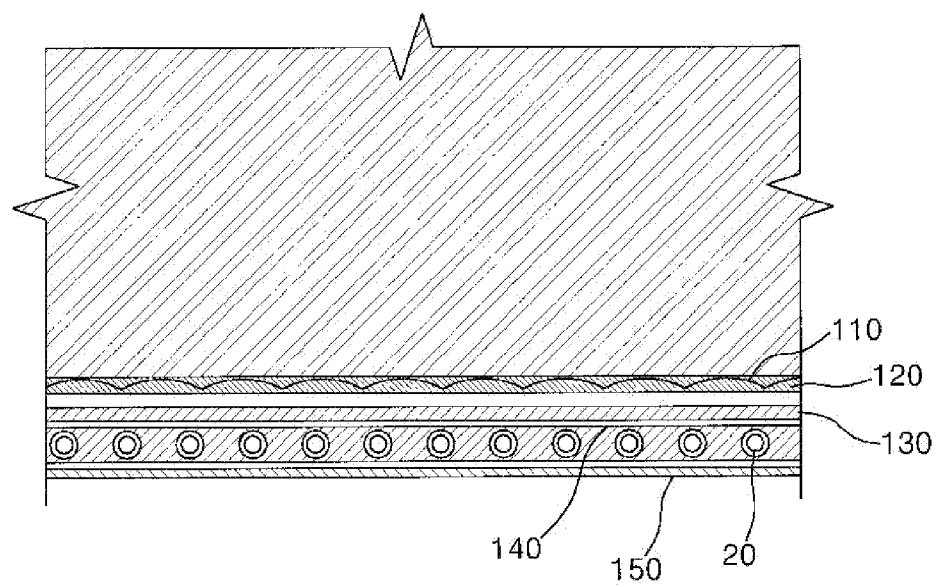


Fig. 5

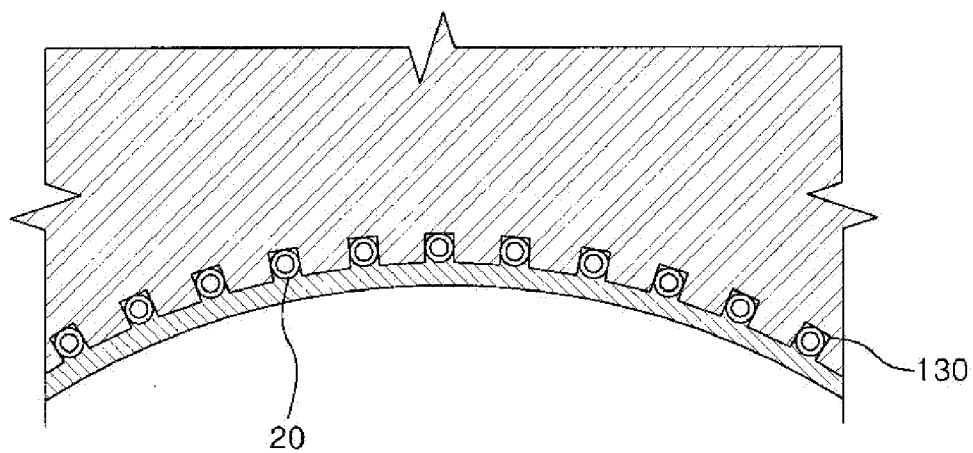


Fig. 6

